



DU PONT CHEMICALS
Wilmington, DE 19898

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45975

Rec'd
3/30/93
JL

March 29, 1993

Mr. Randy Sturgeon, RPM
EPA REGION III
841 Chestnut Street Building
Philadelphia, PA 19107

Dear Mr. Sturgeon:

**CORRECTIONS TO AND ADDITIONAL INFORMATION REGARDING
FOLLOW-UP COMMENTS TO MARCH 3, 1993 MEETING
SITE IMPACT ON ZINC WATER QUALITY
DU PONT NEWPORT SUPERFUND SITE, NEWPORT, DE**

DuPont appreciates the opportunity afforded us by your office to provide follow-up comments to our March 3, 1993 meeting. In my March 12, 1993 letter, Figure 1 contained errors in the labeling of Red Clay Creek and the James Street Bridge. A corrected Figure 1 is enclosed for your records.

In addition, I have included excerpts from the 1988 DNREC Delaware Water Quality Inventory which describe the sampling stations and water quality in the Christina River, Red Clay Creek and White Clay Creek. Permitted dischargers and water quality issues are described. Zinc has been a concern in this river basin for many years. The database shows zinc at ppm levels in the upper reaches of both the Red Clay Creek and White Clay Creek due to industrial dischargers.

After you have had the opportunity to review the attached information and discuss it internally, we would like to meet once again prior to your issuance of the Record of Decision. We believe that when all the data submitted to the Agency is taken together, along with the supplemental information supplied herein, you will find that the site does not significantly contribute to the zinc or any other constituent loading to the Christina River.

Please feel free to call me directly 302/773-4237 if you have any questions regarding this material.

Sincerely yours,

P. Brandt Butler

P. Brandt Butler
Newport Remediation Manager
DuPont Chemicals

PBB:gct
Enclosures

AR320668

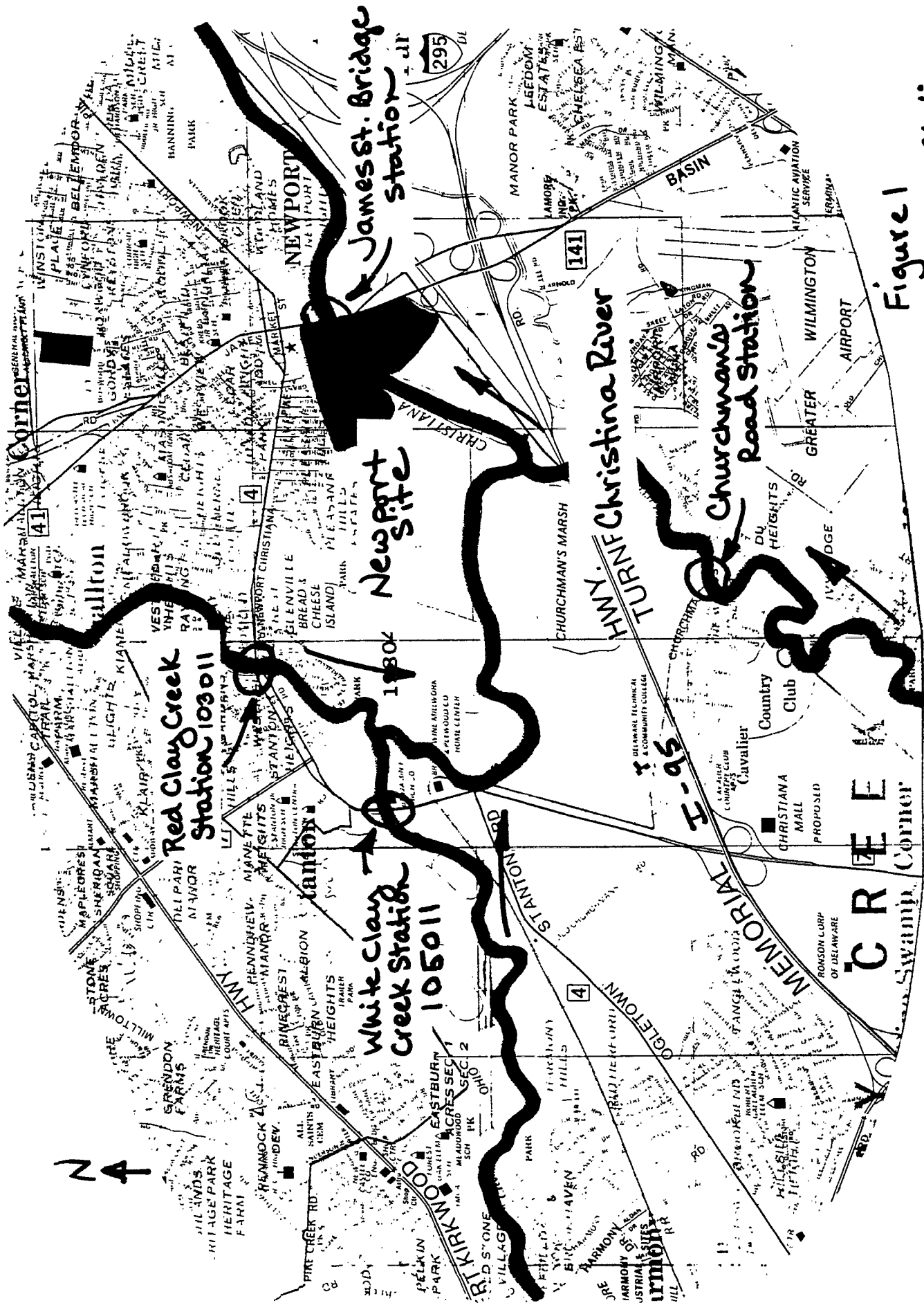


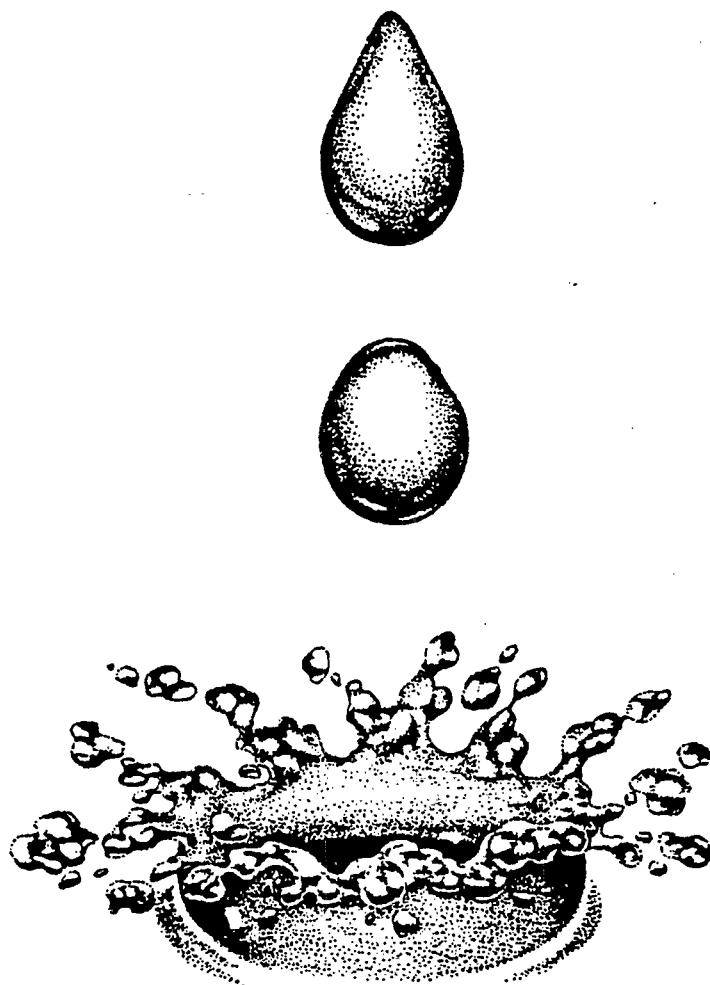
Figure 1
Sampling Stations

3/1/93

AR320669

1988 Delaware Water Quality Inventory

Volume II Basin Analysis



**Prepared April, 1988 by
the Delaware Department of Natural Resources
and Environmental Control**

AR320670

Basin Description

Drainage Area - 45,000 acres	Mainstem Length - 27.00 miles
Land Use	Receiving Waterbody - Delaware River
Agricultural - 22.00%	Interstate Stream - Yes
Urban - 20.00%	Upstream Reaches - Maryland
Other - 58.00%	Downstream Reaches - Delaware

Basin Priority Rank - 7/36

Basin Impoundments - Smalleys Pond, Becks Pond, Sunset Lake

Designated Uses

- | | |
|---------------------------------|------------------------------------|
| 1. Public Supply* | 5. Fish, aquatic life and wildlife |
| 2. Industrial Supply | 6. Coldwater Fishery* |
| 3. Primary Contact Recreation* | 7. Agricultural Supply |
| 4. Secondary Contact Recreation | |

*designated use does not apply to entire stream basin. See Water Quality Standards for Streams, 1985 or page # of this inventory for specifics.

Monitoring

Number of active STORET stations - 12
Number of inactive STORET stations - 0
Number of miles assessed by STORET - 37
Number of CORE stations - 2

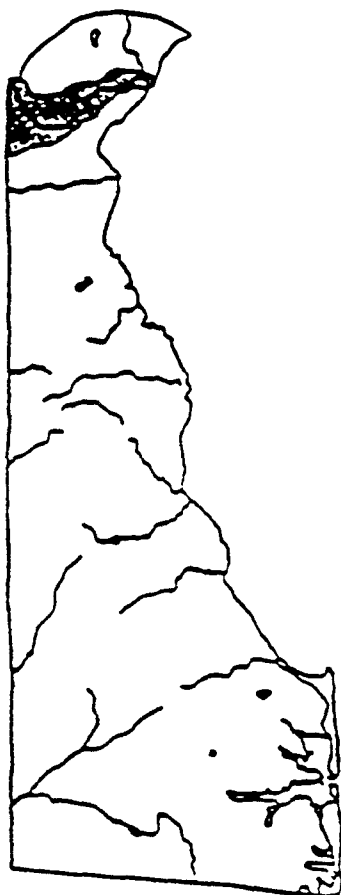
NPDES Permitted Discharges

<u>Name</u>	<u>Type</u>	<u>Flow (MGD)</u>
CIBA-GEIGY Corp.	organic/inorganic chemicals	0.36
du Pont Stine Haskell	laboratory	0.18
du Pont Willow Bank	plastics manufacturing	0.15
du Pont Chestnut Run	laboratory	0.45
General Motors	automotive manufacturer	-
Palm Springs	STP	2.80

Historical Water Quality

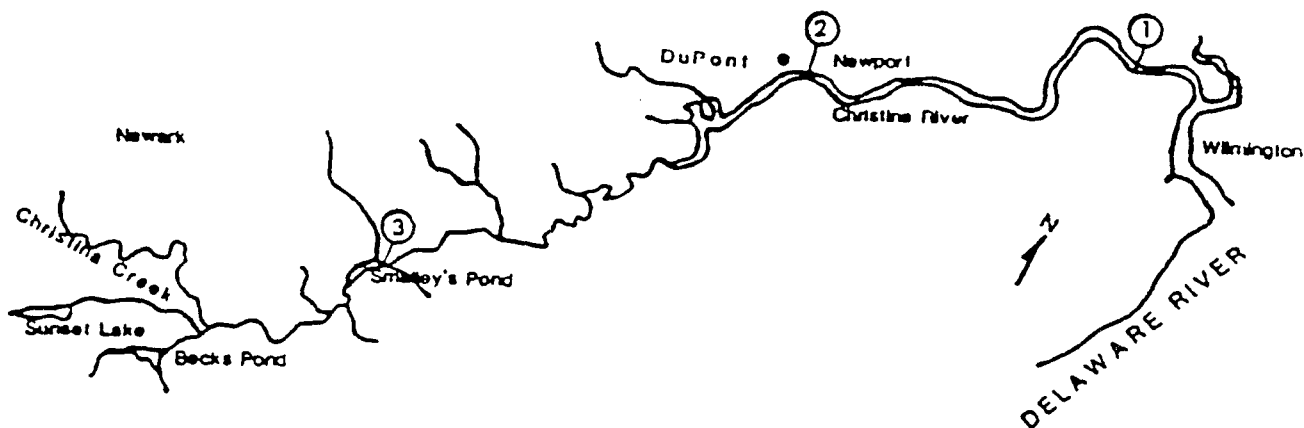
The 1986 Delaware Water Quality Inventory described the river as having water quality insufficient to fully support the Federal Clean Water Act "fishable-swimmable" goal. Primary contact recreation was reported as likely affected by elevated fecal coliform levels throughout the basin. Also, fish and aquatic life propagation was impacted by zinc, phenol, and other toxics in the lower (saline-tidal) portion of the river (i.e. between the Newport monitoring station and the mouth of the Christina at its confluence with the Delaware River). The public water supply use was, however, reported to be fully attained. The public water supply use applies only to the freshwater portions of the Christina.

CHRISTINA RIVER RIVER BASIN MAP AND SAMPLING STATIONS

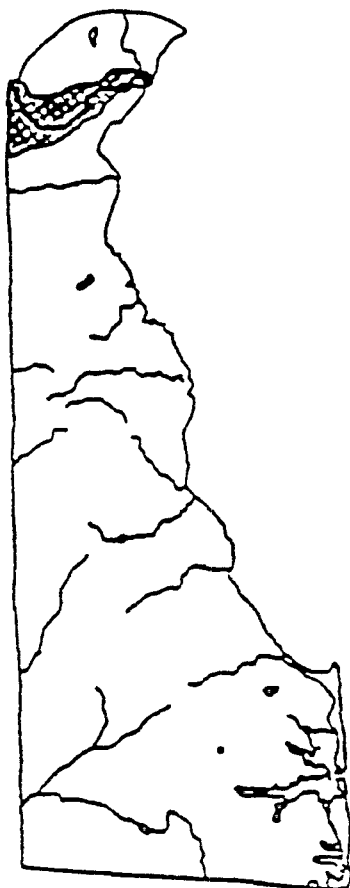


Ambient Sampling Stations Location Description/STORET Station No.

1. U.S. Rt. 13:Third Street Bridge/
106011
2. Del. Rt. 141 Drawbridge:Newport/
106021
3. Smalleys Dam Spillway/106031
4. Rd. 346 bridge (CC5)/1 6111
5. Salem Church Rd., Becks Pond (CC4)/
106121
6. Sunset Lake Rd., Sunset Lake (CC2)/
106131
7. Old Baltimore Pike, Rd. 26 (WB1)/
106141
8. Chestnut Hill Rd., Rd. 364 (WB4)/
106151
9. Del. Rt. 2, West Branch (WB5)/106161
10. Sandy Brae Rd.-Persimmon Run/106171
11. Elkton Rd. (Del. Rt. 2)/106181
12. Del. Rt. 273 (above Newark)/106191

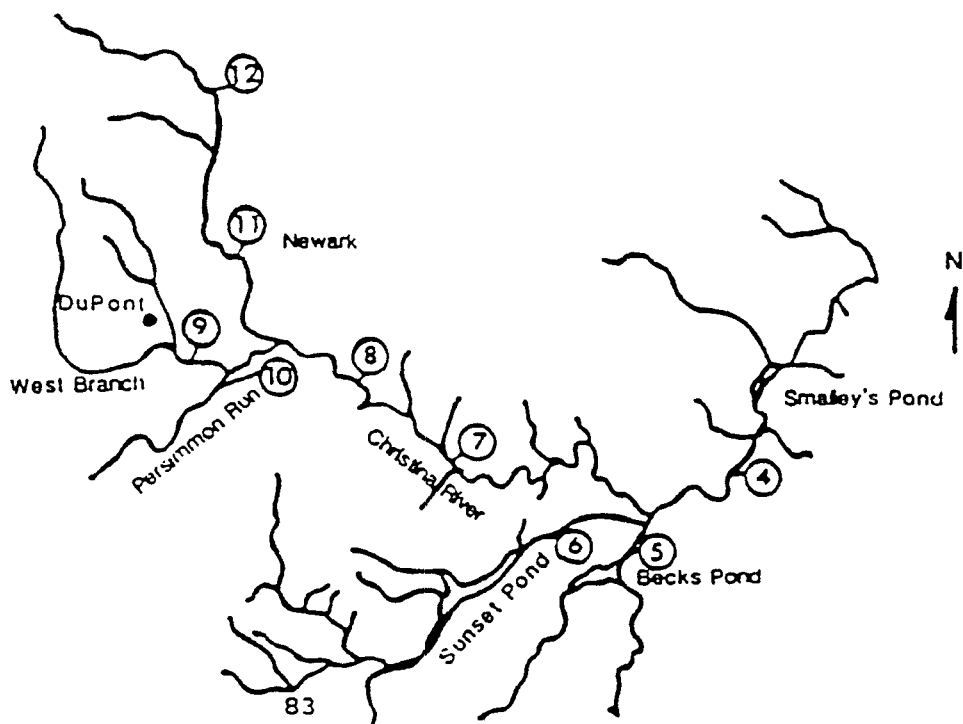


CHRISTINA RIVER RIVER BASIN MAP AND SAMPLING STATIONS



Ambient Sampling Stations Location Description/STORET Station No.

1. U.S. Rt. 13:Third Street Bridge/
106011
2. Del. Rt. 141 Drawbridge:Newport/
106021
3. Smalleys Dam Spillway/106031
4. Rd. 346 bridge (CC5)/1 6111
5. Salem Church Rd., Becks Pond (CC4)/
106121
6. Sunset Lake Rd., Sunset Lake (CC2)/
106131
7. Old Baltimore Pike, Rd. 26 (WB1)/
106141
8. Chestnut Hill Rd., Rd. 364 (WB4)/
106151
9. Del. Rt. 2, West Branch (WB5)/106161
10. Sandy Brae Rd.-Persimmon Run/106171
11. Elkton Rd. (Del. Rt. 2)/106181
12. Del. Rt. 273 (above Newark)/106191



AR320673

Three water quality trends were noted in the 1986 inventory for this river. First, the mean zinc concentrations at the Newport and Third Street monitoring stations trended downward when compared to previous years. The other two trends reported were an increase in bacteria levels at several stations, and an increase in the mean total nitrogen and phosphorus levels at the Persimmon Run station. The causes of the problems noted were (in descending order of importance): point source discharges, nonpoint source runoff, and combined sewer overflows.

Recent Water Quality: June 1985 to September 1987

Analysis of water quality data has been accomplished using the EPA-STORET computer system programs STAND and MEAN (for further details, refer to the Introduction). Examination of the STAND "violations program" results shows evidence of water quality impacts. The STAND evaluation, which is based on approximately 12 samples at each station, shows continuing problems with elevated enterococcus levels throughout most of the basin. The only location where enterococcus was found not to be a problem was at the Beck's Pond station. The STAND results also indicate that alkalinity deficiencies occurred below two of the ponds (corresponding to stations 5 and 6). These alkalinity deficiencies are believed to be the result of natural factors (biological activity in the ponds primarily). Minor pH violations were found at most stations.

A review of the MEAN program results shows evidence of other water quality problems. Most notable is the slightly elevated zinc concentration at the Newport station. Based on a total of 12 samples at the Newport station, a mean concentration of 0.114 mg/l was found. Toxicity to certain fish and aquatic life may be expected at these levels. Overall, nutrient levels were found to be low to moderate throughout the basin. Total nitrogen levels range from 1.2 mg/l to 2.95 mg/l, while total phosphorus values range from 0.06 mg/l to 0.26 mg/l. The upper extremes for nitrogen and phosphorus were the exceptions rather than the rules as the basinwide averages were often below 2.4 mg/l for total nitrogen and 0.1 mg/l for total phosphorus. Both upper extremes were detected at the Persimmon Run station. Fecal coliform levels were on occasion extremely high, but overall low to moderate levels persisted. BOD₅ concentrations were at moderate to high levels.

Biological surveys on the bottom-dwelling invertebrate communities were performed at two stations in 1985. In 1985, the invertebrate community at the downstream station (106031) was characterized by low standing crop and fair species richness. As has been found in previous years at this station, the community was well balanced among the sensitive, facultative, and tolerant categories. The low standing crop at this station is believed to be the result of natural phenomena (i.e. poor geological substrate, short daily photoperiods, and settleable silt) as opposed to man-induced stresses.

The upstream station (106161), in contrast to the downstream station, was characterized by enormous standing crops. The preponderance of facultative/tolerant organisms and filter feeding

organisms found indicates that moderate to heavy enrichment persists at the upstream station.

The STORET monitoring stations 106011 and 106141 illustrated on the stream basin map accompanying this section are CORE stations. As part of the CORE program, sediment samples from station 106011 (13A Bridge Station) have been screened for various organic and inorganic toxic pollutants. Several pesticides and toxic metals have been detected by the screening, but their impact to the designated uses of the river has not been fully determined.

Sampling at CORE station 106141 (Cooche's Bridge) consists of capturing and screening fish for toxic pollutants. Several pollutants have been detected in fish which were captured, but at low levels not expected to be of any impact to designated uses, and at levels not considered a public health concern.

Discussion

The above information suggests that some designated uses are not fully supported. Primary contact recreation may be affected by the elevated enterococcus values seen. Fish and aquatic life propagation may be affected by zinc and other toxics in the lower portion of the basin (Newport station down to confluence with the Delaware River). All available information indicates that the public water supply use is being met completely. The federal Clean Water Act "fishable-swimmable" use is rated "generally attained" for swimmable (enterococcus not excessive, but some risk present), and "partially attained" for fishable.

Comparison of the 1986 and current water quality evaluations reveals several trends. On the plus side, the mean zinc concentrations at the Newport station have trended downward, suggesting a gradual purging of zinc from the system. Also, a decrease in the mean total nitrogen and phosphorus at the Persimmon Run station is noted. Dissolved oxygen also showed improvement in the lower portion of the basin. The causes of the problems noted above (in descending order of importance): point source discharges, non-point source runoff, and combined sewer overflows.

Looking Ahead

DNREC has some special concerns regarding the Christina basin, most of which focus on the lower portion of the basin. First and foremost is assessing what, if any, impact an abandoned waste lagoon located in Newport is having on the surface water and aquatic life of the Christina.

The Halby and Argus Chemical Companies operated a wastewater lagoon near their plant in the Wilmington Marine Terminal area in New Castle County from 1947 to August 1977. Recently, the EPA placed this site on the National Priorities List for cleanup. Impetus for the placement of this site on the NPL include the findings of an EPA Site Investigation which indicated high levels of various organic and inorganic hazardous substances present in surface water and sediment

samples of the abandoned lagoon. Since the lagoon previously drained into the Lobdell Canal and Christina River, there may be a present contamination problem and degradation of the canal and river water quality.

The Christina has been chosen as the site of a pilot project under the Delaware "Stream Watch" program. The objective of this program is to encourage citizen involvement in the protection of stream water quality.

Also impacting the lower basin has been two major oil spills which occurred on the Delaware River, one in early 1985 and one in early 1986. The 1985 spill was found to have but a minor impact on the Christina. Impacts associated with the 1986 spill have yet to be quantified. Combined sewer overflows and discharge from the Red and White Clay Creeks are additional points of concern for the lower Christina basin.

RED CLAY CREEK
USGS HUC 02040205

Basin Description

Drainage Area - 19,295 acres	Mainstem Length - 12.00 miles
Land Use	Receiving Waterbody - White Clay Creek
Agricultural - 21.00%	Interstate Stream - Yes
Urban - 46.00%	Upstream Reaches - Pennsylvania
Other - 33.00%	Downstream Reaches - Delaware

Basin Priority Rank - 1/36
Basin Impoundments - Hoopes Reservoir

Designated Uses

- | | |
|---------------------------------|------------------------------------|
| 1. Public Supply | 5. Fish, aquatic life and wildlife |
| 2. Industrial Supply | 6. Coldwater Fishery |
| 3. Primary Contact Recreation | 7. Agricultural Supply |
| 4. Secondary Contact Recreation | |

*designated use does not apply to entire stream basin. See Water Quality Standards for Streams, 1985 or page # of this inventory for specifics.

Monitoring

Number of active STORET stations - 5
Number of inactive STORET stations - 0
Number of miles assessed by STORET - 11
Number of CORE stations - 1

NPDES Permitted Discharges

<u>Name</u>	<u>Type</u>	<u>Flow (MGD)</u>
Haveg-Ametek, Inc.	glass and plastics processing	0.01
Greenville CC	(STP)	0.015
Hercules Inc.	chemical laboratories	0.35
NVF Yorklyn	pulp and paper	2.99
Center for Creative Arts	(STP)	0.0015
Q-C Inc.	(STP)	0.0002

Historical Water Quality

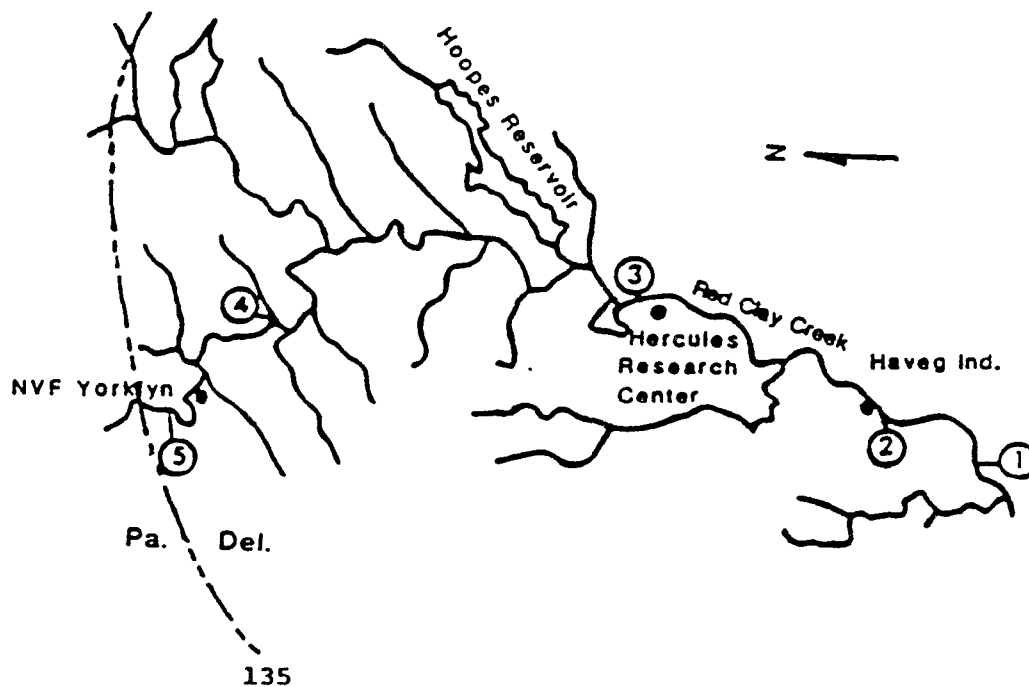
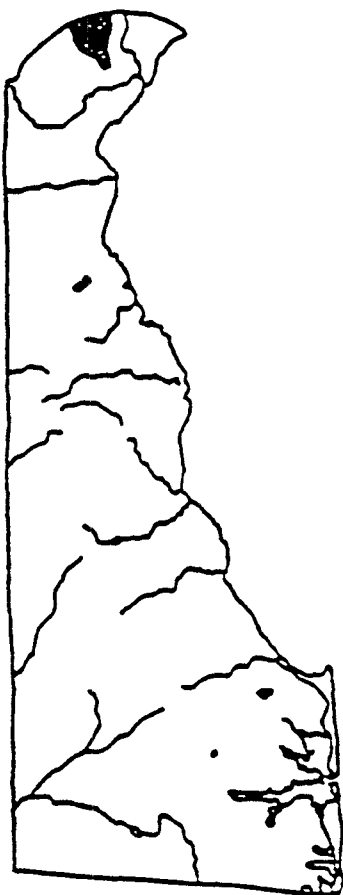
The 1986 Delaware Water Quality Inventory indicated the Federal Clean Water Act "fishable-swimmable" use was "unattained" for fishable, and "generally attained" for swimmable (although both bacteria and toxics findings suggest some risk to swimmers may have existed).

Comparison of 1984 and 1986 water quality in the Red Clay revealed little change. Zinc and total phosphorus were reported to be at nearly identical levels, with total nitrogen and fecal coliform trending upward. Comparison of histological data also revealed little change. Levels of toxic substances in fish collected (primarily white suckers).

RED CLAY CREEK
RIVER BASIN MAP AND SAMPLING STATIONS

Ambient Sampling Stations
Location Description/STORET Station No.

1. Stanton Bridge - Del. Rt. 4/103011
2. Marshallton - Rd. 332/103021
3. Wooddale - Del. Rt. 48/103031
4. Ashland - Rd. 258A/103041
5. Rd. 252 Bridge - Yorklyn/103051



AR320678

The causes of use non-support were reported to be (in descending order of importance): industrial, non-point source runoff in Pennsylvania and municipal discharges in Pennsylvania.

Recent Water Quality: June 1985 to September 1987

Analyses of water quality data has been accomplished using the EPA-STORET computer system programs STAND and MEAN (for further details, refer to the Introduction). Examination of the STAND "violations programs" results shows evidence of water quality impacts. The STAND evaluation, which is based on an average of approximately 26 samples at each station, shows continuing problems with excessive bacteria levels throughout the basin. This findings suggests that the primary contact recreation use may not be fully supported.

A review of the MEAN program results shows evidence of additional water quality problems. Zinc concentrations are elevated throughout the basin, and worsen as one moves upstream from Stanton to Ashland. The highest zinc concentrations are noted (average 0.618 mg/l with a maximum of 1.55 mg/l) at the Ashland sampling station. Elevated cadmium concentrations were also recorded at the Stanton sampling station. Acute toxicity to certain aquatic organisms may be expected at these levels. Nutrient concentrations are moderate to high throughout the basin, with the worst problems evident closest to the PA-DE state line. Mean total nitrogen levels range from 3.7 mg/l to 4.9 mg/l, while mean total phosphorus concentrations range from 0.25 mg/l to 0.43 mg/l.

The 1985 biological survey results also indicated multiple stresses (toxicity and enrichment) at Ashland and Yorklyn stations. At station 103041, the standing crop was well above what it had been in 1984, while species richness, diversity and equitability had declined over the same period in question. These trends indicate an overall diminution of biological health. One possible explanation for this downward trend is that the unusual spring drought experienced during the 1985 sampling effort magnified the stresses already known to exist at that station. At station 103051, the benthic community appeared to be improved over the previous year. The 1985 results did not indicate spectacular recovery nor improving water quality however as species richness and diversity had merely gone from poor to fair. Virtually all organisms identified were either of the facultative or tolerant categories, thus suggestive of toxic stress.

The 1986 biological survey results again indicated multiple stresses (toxicity and enrichment) at both Ashland (103041) and Yorklyn (103051). The Ashland survey results indicated a lower standing crop and more tolerant species to toxic wastes compared to the Yorklyn sample; thus indicating a greater level of toxicity at Ashland. The Yorklyn survey results indicated a large standing crop, reduced species richness of facultative species and lack of sensitive, flowing water insect larvae also suggested mild toxic impacts at Yorklyn.

In addition to the annual biosurveys and water quality monitoring, DNREC also collects and analyzes fish once per year to test for the presence of toxic metals and synthetic organic chemicals. Similar

testing is performed on the Pennsylvania portion of the creek by Pennsylvania's Department of Environmental Regulation (PADER) and analyses have revealed that contaminant levels there are significantly higher than in Delaware. PADER has informed DNREC that, as a result of their intensive sampling efforts, they are narrowing in on the toxicity source(s).

The contention that contaminant levels are more severe in the Pennsylvania portion of the creek was further borne out by chronic bioassay screening tests conducted by the Environmental Research Laboratory of the EPA in April of 1985. The "state of the art" EPA tests, intended to detect the more subtle effects of ambient toxicity, were run on several aqueous creek samples using the macroinvertebrate Ceriodaphnia affinis/dubia. The results of their tests indicated that a conservative pollutant source lies above Kennett Square, Pennsylvania on the West Branch of the creek and that the creek demonstrates no significant recovery until it reaches Stanton, Delaware. Because these tests were merely of a screening nature, DNREC and PADER water quality personnel worked together to arrange for EPA to conduct "definitive" bioassays in the spring and late summer of 1986. Samples were taken from two ambient stream locations in Delaware (STORET 103051 and 103041) and one effluent (NVF Yorklyn).

In 1985, a Site Investigation was performed by EPA on the NVF Stateline Landfill. The report concluded that impacts to the Red Clay Creek from the landfill are localized and minimal and that there is no threat to human health as a result of off-site migration of contaminants.

Discussion

The above discussion suggests that some designated uses are not fully supported. Primary contact recreation may be affected by elevated bacteria levels. Fish and aquatic life propagation is affected by zinc and possibly other toxic compounds in the creek. This contention is supported by the findings of the biological surveys discussed previously. Potential risks also exist to the public water supply use as a result of the toxicity problems noted. Best professional judgement leads us to believe that the federal Clean Water Act "fishable-swimmable" use is best characterized as "unattained" for fishable and "generally attained" for swimmable (although both bacteria and toxics findings suggest some risk to swimmers may exist).

In 1986, upon review of fish tissue contaminant data, the Division of Fish and Wildlife ceased trout stocking of the Red Clay Creek between the PA-DE stateline and Stanton. Also at that time, the Department of Public Health and the Department of Natural Resources and Environmental Control issued a joint health advisory against the consumption of Red Clay Creek resident fish species. The health advisory remains in effect.

Comparison of 1986 and current water quality in the Red Clay reveals little change. Zinc and total phosphorus have remained at nearly identical levels, while total nitrogen and fecal coliform have trended slightly downward. Comparison of histological data also

reveals little change. Levels of toxic substances in fish collected (primarily white suckers) remain elevated but essentially unchanged over this period of record.

The causes of use non-support are estimated as follows (in descending order of importance): industrial, non-point source runoff in Pennsylvania, and municipal discharges in Pennsylvania.

Looking Ahead

The Red Clay Creek has been designated as DNREC's top priority basin. As such, we have formulated and initiated a multi-year "Use Attainability" study of this basin. The primary objective of this project is to develop a basinwide management plan which outlines the actions necessary to obtain the current designated uses. Once this is complete, an Action Plan will be formulated which outlines the follow-up steps which should be taken to control the problems identified in the Use Attainability Study.

An Inter-Agency Task Force consisting of representatives from the EPA Region III, the Pennsylvania Department of Environmental Regulation (PADER), and DNREC was formulated to provide oversight for the Use Attainability Study and the proposed Action Plan. Further, a Memorandum of Understanding (MOU) has been drafted for consideration by the Department heads of DNREC and PADER, and the Director of the EPA Region III. The MOU will provide added commitment from the respective parties for remediating the Red Clay Creek's water quality.

The Red Clay Creek has been chosen as the site of a pilot project under the Delaware "Stream Watch" program. The objective of this program is to encourage citizen involvement in the protection of stream water quality.

WHITE CLAY CREEK
USGS HUC 02040205

Basin Description

Drainage Area - 29,401 acres	Mainstem Length - 14.00 miles
Land Use	Receiving Waterbody - Christina River
Agricultural - 31.00%	Interstate Stream - Yes
Urban - 32.00%	Upstream Reaches - Pennsylvania
Other - 37.00%	Downstream Reaches - Delaware

Basin Priority Rank - 3/36
Basin Impoundments - None

Designated Uses

- | | |
|---------------------------------|------------------------------------|
| 1. Public Supply* | 5. Fish, aquatic life and wildlife |
| 2. Industrial Supply | 6. Coldwater Fishery* |
| 3. Primary Contact Recreation* | 7. Agricultural Supply* |
| 4. Secondary Contact Recreation | 8. ERES* |

*designated use does not apply to entire stream basin. See Water Quality Standards for Streams, 1985 or page # of this inventory for specifics.

Monitoring

Number of active STORET stations - 6
Number of inactive STORET stations - 0
Number of miles assessed by STORET - 18
Number of CORE stations - #

NPDES Permitted Discharges

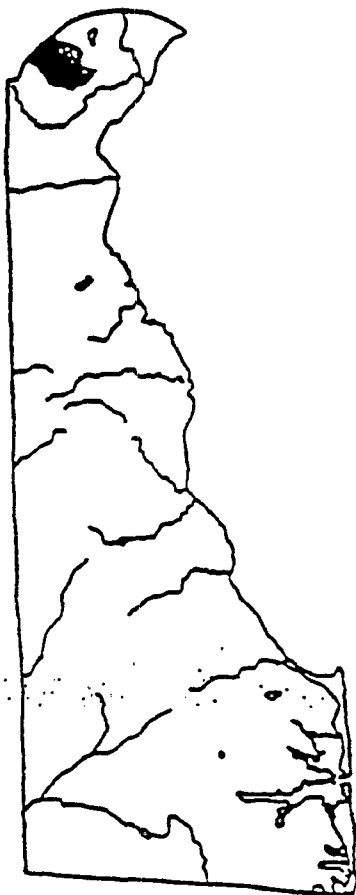
<u>Name</u>	<u>Type</u>	<u>Flow (MGD)</u>
FMC Corp.	food and pharmaceuticals	0.06
Hockessin Foods Inc.	food processing	0.008
NVF Newark	pulp and paper	0.60

Historical Water Quality

The 1986 Delaware Water Quality Inventory presented evidence of water quality impacts to the White Clay Creek. Elevated zinc concentrations were found in the creek downstream of the NVF-Newark facility, and the levels were high enough to expect toxic effects to certain fish and aquatic life. As such, the aquatic life and fish propagation use was reported to be only partially attained. Also, elevated fecal coliform levels resulted in impacts to the primary contact recreation use. Therefore, the Federal Clean Water Act was rated only "partially attained".

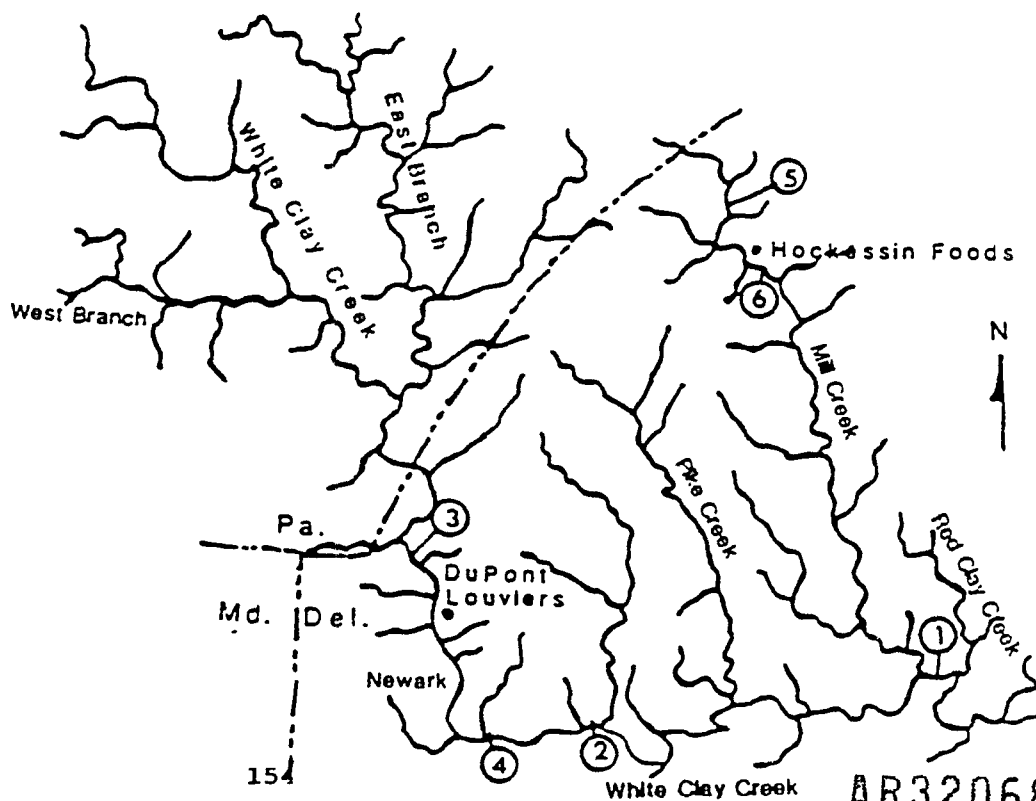
Comparison of the 1984 inventory to the 1986 inventory indicated several trends. One, zinc levels in the creek below NVF were lower. Two, increasing counts of bacteria were observed at all stations.

WHITE CLAY CREEK
RIVER BASIN MAP AND SAMPLING STATIONS



Ambient Sampling Stations
Location Description/STORET Station No.

1. Del. Rt. 7 bridge, Stanton/105011
2. Del. Rt. 2 bridge/105021
3. Rd. 329 bridge/105031
4. Del. Rt. 72 Bridge/105041
5. Road 285 Mill Creek/105051
6. Road 282 Mill Creek/105061



Impacts to the creek water quality were reported to include the release of zinc in the creek sediment into the water column, intermittent "slugs" of organic chemicals from mushroom observations in Pennsylvania and Delaware, agricultural runoff, and sewer overflows in Newark.

Recent Water Quality: June 1985 to September 1987

Analysis of water quality data has been accomplished using the EPA-STORET computer system programs STAND and MEAN (for further detail, refer to the Introduction). Examination of the STAND "violations program" results shows evidence of water quality impacts. The STAND evaluation, which is based on approximately 24 samples at each station, shows continuing problems with excessive bacteria levels throughout the basin. No other problems are noted. These findings suggest that the primary contact recreation use may not be fully supported.

A review of the MEAN program results shows evidence of other water quality problems. Elevated zinc concentrations are found in the creek downstream of the NVF-Newark facility, with values ranging from 0.293 to 0.510 mg/l, with a maximum value of 1.32 mg/l. Toxicity to certain fish and aquatic life may be expected at these levels. Nutrient concentrations are variable in the basin, with moderate to high values fairly common. Total nitrogen levels averaged from 3.21 to 7.02 mg/l, while total phosphorus values range from 0.09 to 0.15 mg/l. The excessive nutrient levels of a maximum total nitrogen equal to 7.02 mg/l and a maximum total phosphorus of 1.46 mg/l were recorded at the Stanton sampling station. Mill Creek nutrient and bacteria conditions are similar to White Clay, except Mill Creek did not maintain elevated zinc levels.

A biological survey of the bottom-dwelling invertebrate communities was conducted at stations 1, 2, and 3 in 1985 (see the basin map). Station 1 had low number of organisms and generally reflected poor water quality. Station 2 also had a low number of organisms, most of them tolerant types, and appeared to have water quality worse than Station 1. Station 3 results showed reasonable species diversity and equitability, increased numbers of sensitive organisms, and large overall community size. Overall, 1985 results showed substantial improvement over previous years, with less toxic impact apparent, but continued elevated enrichment.

A biological survey conducted in the summer of 1987 at stations 1 and 3 showed similar results to the 1985 survey. Station 1 reflected poor water quality and station 3 reflected reasonable to good water quality. However, results from Station 1 were more indicative of "toxic stress" on the aquatic macroinvertebrate communities than previously in 1985.

Discussion

The above information suggests that some designated uses are not fully supported. Primary contact recreation may be affected by the elevated bacteria values seen. Fish and aquatic life propagation is affected by zinc and other toxics in the creek, as evidenced by the

findings of the biological surveys, leading to partial non-attainment of this use. Potential risks also exist to the public water supply use as a result of the toxicity problems noted. Thus, the federal Clean Water Act "fishable-swimmable" use must be rated "partially attained" for fishable (below Newark generally unattained), and "generally attained" for swimmable (bacteria levels are not extreme, but risks are present).

Comparison of 1986 and current water quality evaluations reveals that zinc levels remained relatively the same. Also, there has been a substantial increase in nutrient levels at the Stanton sampling location.

Looking Ahead

Part of White Clay Creek has been designated as an "ERES" water in the 1985 revision to the Delaware Water Quality Standards for Streams. This designation has been added because the creek has value as an exceptional recreational and ecological resource. "ERES" requires higher levels of treatment for pollution sources, and indicates DNREC's intent to provide higher levels of protection and monitoring.

The toxicity problem in the White Clay is a major concern. This problem is similar to, but not as severe as, the problem in Red Clay Creek. DNREC is involved in multi-agency monitoring and research on the Red Clay, and expects to apply knowledge obtained through this work to the situation on the White Clay.